

# Outcome of surgical management of pterygium in Brunei Darussalam

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## ABSTRACT

**Introduction:** A pterygium is an elevated, superficial, external ocular mass that usually forms over the peri-limbal conjunctiva and extends onto the corneal surface. It is more common in the tropics secondary to higher exposure to ultraviolet light. This study compares the various techniques of pterygium surgery including bare sclera, conjunctival autograft, and conjunctival mini-graft (with or without intra-operative Mitomycin C application) in terms of surgical outcome and recurrence rate and to identify the risk factors for recurrence and complications. **Materials and Methods:** 959 patients operated for pterygium were retrospectively studied to determine the complications and recurrence rate after pterygium excision using the above mentioned surgical techniques. 625 (65.7%) were males. The mean age was  $44 \pm 12$  years. Risk factors for recurrence were also studied. **Results:** The recurrence rate of pterygium was 17.4%. There was no significant difference between the three surgical techniques in terms of recurrence rate ( $p = 0.28$ ). Younger age was associated with higher recurrence rate ( $p = 0.001$ ); There was no significant correlation between gender and recurrence of pterygium ( $p = 0.48$ ). The bare sclera recurrence developed after a longer period of time compared to conjunctival grafts ( $p = 0.002$ ). The commonest complication was granuloma (3.9%), followed by scleral thinning and/or melting (1.4%). **Conclusion:** The study showed no statistically significant difference in terms of recurrence rate between the three pterygium surgical procedures studied. However, among cases of recurrence, those following bare sclera technique showed delayed recurrence compared to conjunctival autografts and conjunctival minigraft. The use of Mitomycin C adjunctive therapy was associated with significant reduction in recurrence rate. On the other hand, younger age group was associated with significantly higher recurrence rate

**Keywords:** Complications, Mitomycin C, pterygium, recurrence, sclera

## INTRODUCTION

A pterygium is an elevated, superficial, external ocular mass that usually forms over the peri-limbal conjunctiva and extends onto the

corneal surface. The pathophysiology of pterygia is characterized by elastotic degeneration of collagen and fibrovascular proliferation, with an overlying covering of epithelium. If not treated pterygia may progressively grow in size to distort the corneal topography, and even occlude the optical axis in advanced cases. In advanced cases, they can

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cause significant alteration in visual function. They also can become inflamed, resulting in redness and ocular irritation.

In general, countries nearer the equator have higher rates of pterygia. <sup>1</sup>This is possibly due to the higher exposure to ultra-violet light (UV-B), which is a known risk factor for the development of pterygium. <sup>1</sup>The prevalence of pterygium among the Malay population in Singapore was found to be 12.3%. <sup>2</sup>The Chinese population in the same geographical location had a much lower prevalence rate (6.9%) suggesting a possible ethnic predilection. <sup>3</sup>

The main options for surgical removal of pterygium include excision with bare sclera (with or without Mitomycin C or radiotherapy), excision with conjunctival autograft, excision with conjunctival minigraft and excision with amniotic membrane graft. <sup>4</sup>

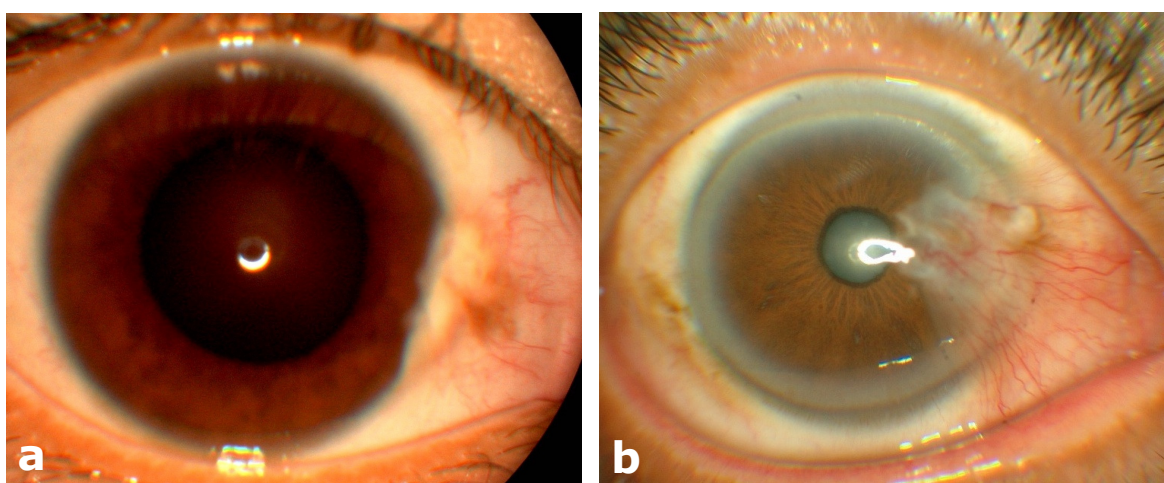
There is no available data in the literature on the prevalence and management of pterygium in Brunei Darussalam. This study analysed clinical outcomes of different

surgical approaches used for the management of pterygium in Brunei Darussalam.

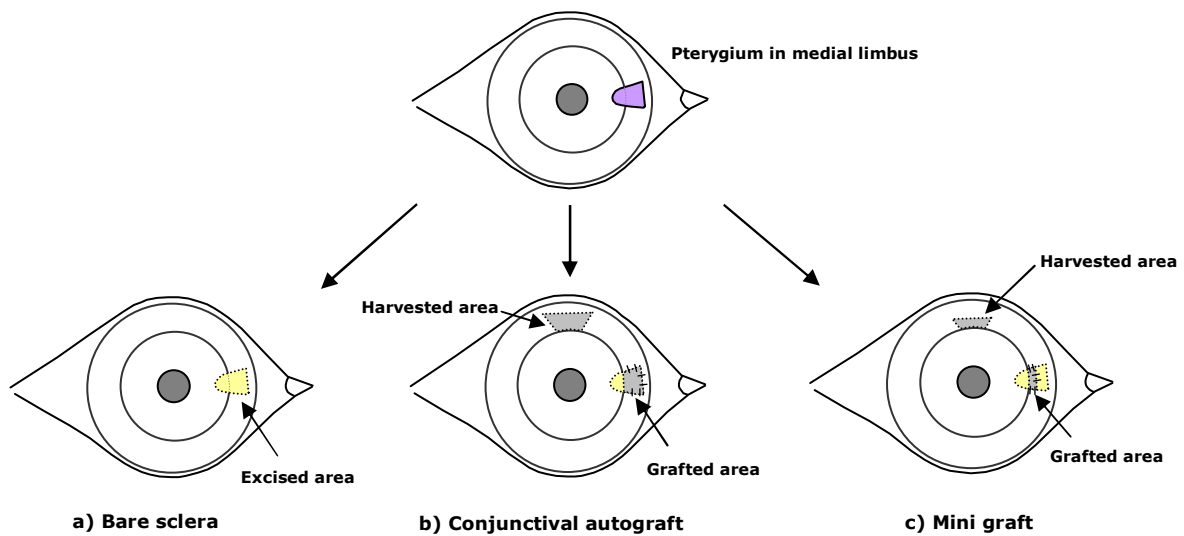
## **MATERIALS AND METHODS**

This is a retrospective study that included all patients who underwent pterygium excision surgery in the Department of Ophthalmology, RIPAS Hospital, Bandar Seri Begawan, Brunei Darussalam, in the period from January, 1995 to December, 2006, who completed at least one year of follow up. Pterygia included in the study ranged from small, atrophic quiescent lesions (Figure 1a) to large, aggressive, rapidly growing fibrovascular lesions (Figure 1b).

In cases where bare sclera technique is done, the pterygium is dissected off its corneal and conjunctival bed under local anaesthesia, and excised leaving a 3mm x 3mm area of bare sclera on the site. The eye is then padded after putting terramycin ointment. Cases which undergo excision with conjunctival autograft have the same procedure done, then a 3.5mm x 3.5 mm graft is fashioned from the superior limbus. The graft is anchored with 8/0 Vicryl sutures in the corners. The minigraft procedure is similar, but



**Fig. 1: a) anterior segment of the right eye showing a small nasal atrophic pterygium and b) anterior segment the right eye showing a large nasal aggressive fibrovascular pterygium.**



**Fig. 2:** Schematic diagram depicting the three types of surgery a) bare sclera, b) conjunctival autograft and c) mini graft and topical Mitomycin C is used depending on the choice of the operating surgeon based on risk for recurrence.

with only 1mm juxta-limbal conjunctiva excised with the pterygium. A narrow strip of graft measuring 3.5mm x 1.5mm from the superior conjunctiva including limbus cells is fashioned to cover the bare sclera. The graft is also anchored to the corners with 8/0 vicryl sutures. Cotton tip soaked with Mitomycin C (0.04%) solution is applied at the site of the bare sclera for two minutes. The site is then washed with sterile saline solution.

Age, gender, operated eye, location and type of the pterygium, surgical technique used, use of Mitomycin C adjunctive therapy, complications and time to recurrence (if any) were collected for all patients and recorded in the data sheet. Complications assessed in this study included granuloma and adhesions, recurrence of pterygium, and postoperative scleral thinning/melting. In general, younger patients and patients with recurrent pterygia were listed for excision with conjunctival autograft or minigraft with or without the use of Mitomycin C (based on surgeon's preference) in view of their higher risk of recur-

rence. Middle-aged and old-aged patients with primary pterygia were listed for excision with the bare sclera technique, with or without the use of Mitomycin C. The effect of Mitomycin C on the success rate and presence of complications was also studied. Mitomycin C is used when a high potential for recurrence is anticipated. It is used intra-operatively as topical application of 0.04% solution for three minutes over the bare sclera site after removing the pterygium. Postoperatively, Mitomycin C (0.04%) eye drops are also used for five days in this group of patients.

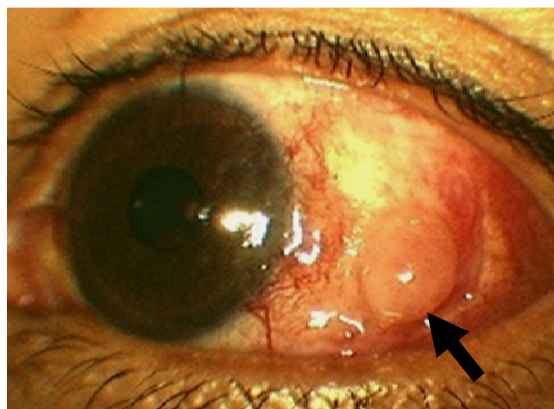
Analyses were done using Statistical Package for Social Science, Version 13.0 (SPSS, Chicago, IL, USA) programme. Descriptive analysis, Chi-squared, bivariate correlational analysis and independent-sample T test were statistical tests used where appropriate. Level of significance was taken with p value less than 0.05.

## RESULTS

The study included 959 patients, of whom

625 were male (65.7%). The mean age was  $44 \pm 12$  years (range, 11 to 84 years). The right eye was operated on in 417 patients (43.5%) compared to 416 (43.4%) left eye operations. Both eyes were operated on in 126 patients (13.1%). Pterygium was located nasally in 881 patients (84.9%), temporally in 51 patients (5.3%) and in 93 patients (9.7%) had double (nasally and temporally) pterygium. 898 patients (94.2%) had primary pterygium (Table 1).

Mitomycin C was used as adjunctive therapy intraoperatively in 44 cases (4.6%), and postoperatively in 565 cases (58.9%). Recurrence occurred in 167 cases (17.4%). After pterygium recurrence, the commonest complication was the development of a granuloma (Figure 3), which occurred in 37 cases (3.9%). Scleral thinning and melting following the use of Mitomycin C occurred in 13 cases (1.4%). The presence of complications was significantly associated with higher recurrence rate ( $p < 0.001$ ).



**Fig. 3: Anterior segment showing a granuloma (arrow) that developed following pterygium excision.**

Among our study population, the use of adjunctive treatment with intraoperative or postoperative Mitomycin C was significantly correlated with young age ( $p < 0.001$ ). On the other hand, there was no significant correlation between gender and recurrence of pterygium ( $p = 0.48$ ).

There was no statistically significant difference between the three surgical techniques used in this study with regards to recurrence rate ( $p = 0.289$ ). However, among

**Table 1: Demographic and characteristic of patients with pterygium.**

<b>Gender</b>	
Male: Female	625 (65.7): 326 (34.3)
<b>Eye operated</b>	
Right	417 (43.5)
Left	416 (43.4)
Both	126 (13.1)
<b>Location of pterygium</b>	
Nasal	881 (84.9)
Temporal	51 (5.3)
Double	93 (9.7)
<b>Type of pterygium</b>	
Primary	898 (94.2)
Secondary	55 (5.8)
<b>Surgical technique used</b>	
Bare sclera	820 (85.8)
Conjunctival autograft	110 (11.5)
Mini graft	26 (2.7)

Percentages are presented in parenthesis

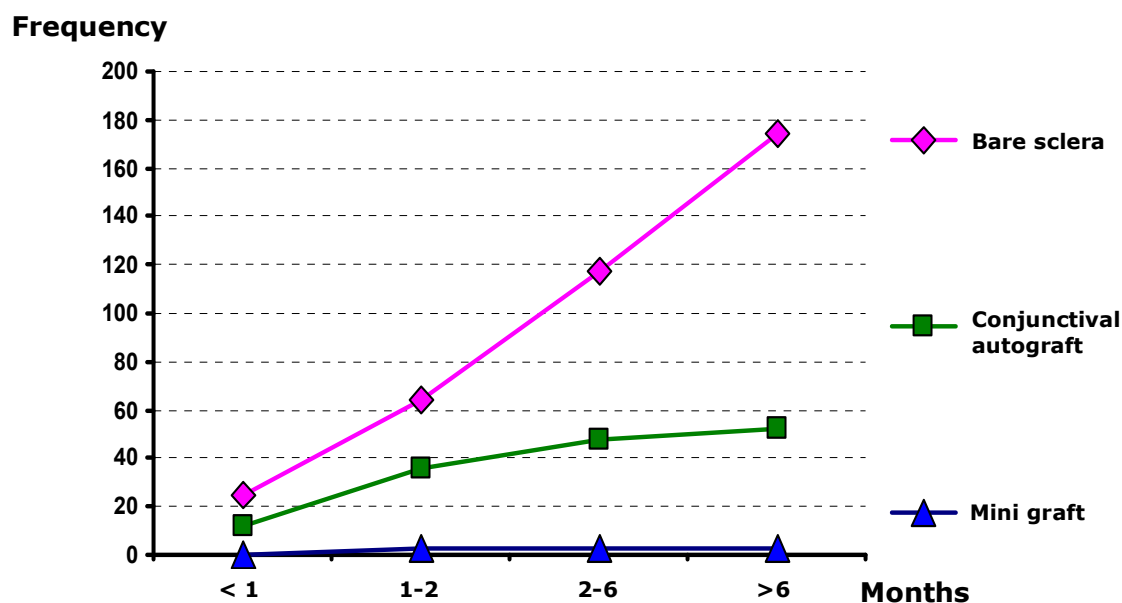


Fig. 4: Line chart showing the cumulative number of patients with recurrence in each surgical technique over time.

cases with recurrence, eyes operated with the bare sclera technique developed recurrence after a longer time compared to those with conjunctival graft ( $p = 0.002$ ) (Figure 4).

The use of intraoperative and/or postoperative Mitomycin C as adjunctive therapy was more in cases with double (nasally and temporally) pterygium compared to cases with one sided pterygium (either nasal or temporal) in this study ( $p < 0.001$ ), and it was associated with significant reduction in recurrence rate ( $p < 0.001$ ), and longer time to recurrence in patients who had it ( $p < 0.001$ ). However, in our study, the use of adjunctive therapy was associated with a significantly higher risk of scleral thinning/melting as compared to those who had not

## DISCUSSION

Although pterygium appears to be a simple ophthalmic problem, it may be potentially blinding in some neglected severe cases. Pterygium is related to ultraviolet light (UV-B)

exposure, thus, it is commoner in outdoor workers, especially seafarer/equatorial countries.<sup>5</sup> In Singapore, the prevalence of pterygium was studied among Malay and Chinese populations in two separate population-based studies.<sup>2,3</sup> It was found to be 12.3% among Malay, and seven percent among Chinese. In Brunei Darussalam, the majority of outdoor workers are males. This can be clearly seen in the male predominance in our study population (65.7%).

The recurrence rate of pterygium among our patients was 17.4%. In a recent study in United States, Hispanics were found to have higher tendency to develop pterygium recurrence compared to whites.<sup>6</sup>

In our study there was a significant correlation between age and the presence of pterygium. This correlation was found in most of the pterygium prevalence studies in the literature.<sup>2,3</sup> A possible explanation of this may be that with age progression, the cumu-

lative dose of ultraviolet light exposure would be higher than that of a younger age group.<sup>5</sup>

In our study, there was no significant correlation between surgical procedure used and recurrence rate. However, the bare sclera technique was associated with the longer time to recurrence compared to the other two techniques used. This finding was not consistent with evidence from the literature. Alpay *et al.*<sup>7</sup> reported a significantly higher recurrence rate when the bare sclera technique is used compared to cases with conjunctival autograft. A possible explanation for this controversy is that in our study, Mitomycin adjunctive therapy was used in a larger number of patients in the bare sclera group than the other two groups.

Although the use of Mitomycin 0.4mg/ml was associated with statistically significant reduction in the recurrence rate, it was also associated with significantly higher risk of scleral thinning and melting following pterygium excision. Enock *et al.*<sup>8</sup> reported the use of Mitomycin 0.4mg/ml in Nigerian pterygium patients with no occurrence of scleral melting or thinning. On the other hand, Tsai *et al.*<sup>9</sup> reported the occurrence of scleral thinning following the use of intraoperative Mitomycin C in China. This difference may be attributed to possible ethnic variations in terms of scleral response to Mitomycin. Despite the risk of scleral thinning/melting following the use of Mitomycin C, its use in patient with high risk of recurrence is justifiable in view of the potentially blinding consequences of pterygium recurrence.

This study shows the current situation of pterygium surgery in Brunei Darussalam, comparing the three surgical procedures commonly used. The limitations in this study included the retrospective data collection reflected in missing data for some patients. The lack of ethnic data was also a weakness in the study, preventing possible comparisons with other similar regional studies and questioning whether data was representative to Bruneian population.

New surgical techniques have been introduced to reduce risk of recurrence and complications in the management of pterygium. The use of amniotic membrane grafts and tissue organic glue are the main advances reported in the literature.<sup>10, 11</sup> The use of amniotic membrane grafts in recurrent and refractory surgeries was recently started in our local setting.

In conclusion, our study showed no statistically significant difference in terms of recurrence rate between the three pterygium surgical procedures studied. However, among cases of recurrence, those following the bare sclera technique showed delayed recurrence compared to conjunctival autografts and conjunctival minigraft. The use of Mitomycin C adjunctive therapy was associated with significant reduction in recurrence rate. On the other hand, a younger age group was associated with significantly higher recurrence rate.

## **REFERENCES**

- 1:** Mackenzie FD, Hirst LW, Battistutta D, Green A. Risk analysis in the development of pterygia. *Ophthalmology.* 1992; 99:1056-61.
- 2:** Cajucom-Uy HY, Tong LH, Wong TY, Tay WT, Saw SM. The Prevalence of and Risk Factors for Pterygium in an Urban Malay Population: The Singapore Malay Eye Study (SIMES). *Br J Ophthalmol.* 2009 Dec 3. [Epub ahead of print]
- 3:** Wong TY, Foster PJ, Johnson GJ, Seah SK, Tan DT. The prevalence and risk factors for pterygium in an adult Chinese population in Singapore: the Tanjong Pagar survey. *Am J Ophthalmol.* 2001; 131:176-83.
- 4:** Massaoutis P, Khemka S, Ayliffe W. Clinical outcome study of a modified surgical technique for pterygium excision. *Can J Ophthalmol.* 2006; 41:704-8.
- 5:** Threlfall TJ, English DR. Sun exposure and pterygium of the eye: a dose-response curve. *Am J Ophthalmol.* 1999; 128:280-7
- 6:** Kandavel R, Kang JJ, Memarzadeh F, Chuck RS. Comparison of pterygium recurrence rates in Hispanic and white patients after primary excision and conjunctival autograft. *Cornea.* 2010; 29:141-5.
- 7:** Alpay A, Uğurbaş SH, Erdoğan B. Comparing techniques for pterygium surgery. *Clin Ophthalmol.* 2009; 3:69-74.
- 8:** Enock ME, Omoti AE, Dawodu OA, Fuh UC, Eguaoje IE. Effectiveness of Intra-operative Mitomycin-C in Reducing the Recurrence of Pterygium in Irrua, Nigeria. *Niger Postgrad Med J.* 2010; 17:55-9.
- 9:** Tsai YY, Lin JM, Shy JD. Acute scleral thinning after pterygium excision with intraoperative mitomycin C: a case report of scleral dellen after bare sclera technique and review of the literature. *Cornea.* 2002; 21:227-9.
- 10:** Jain AK, Bansal R, Sukhija J. Human amniotic membrane transplantation with fibrin glue in management of primary pterygia: a new tuck-in technique. *Cornea.* 2008; 27:94-9.
- 11:** Cohen RA, McDonald MB. Fixation of conjunctival autografts with an organic tissue adhesive. *Arch Ophthalmol* 1993; 111:1167-8.